

1 **All Pending Claims:**

2
3 **(in Clear Form, in accordance with 37 CFR §1.121):**

4
5 Please amend claims 1-3, 22, 26, 33, and 34 and add claims 36-42 as indicated
6 below:

7
8 1. **(AMENDED)** An audio watermarking system comprising
9 a pattern generator to generate both a strong watermark and a weak
10 watermark; and
11 a watermark insertion unit to selectively choose insertion of the strong
12 watermark or the weak watermark into segments of the audio signal.

13
14 2. **(AMENDED)** An audio watermarking system comprising:
15 a pattern generator to generate both a strong watermark and a weak
16 watermark; and
17 a watermark insertion unit to insert the strong watermark and the weak
18 watermark into the audio signal,
19 wherein the watermark insertion unit selectively inserts the strong
20 watermark or the weak watermark into segments of the signal according to an
21 audible measure of the segments.

22
23 3. **(AMENDED)** An audio watermarking system comprising:
24 a pattern generator to generate both a strong watermark and a weak
25 watermark;

1 a watermark insertion unit to insert the strong watermark and the weak
2 watermark into the audio signal;

3 a processor to determine a hearing threshold for the audio signal; and

4 the watermark insertion unit inserts the strong watermark when the signal
5 exceeds the hearing threshold and insert the weak watermark when the signal falls
6 below the hearing threshold.

7
8 4. An operating system comprising an audio watermarking system as
9 recited in claim 1.
10

11 5. An audio watermark encoding system comprising:

12 a converter to convert an audio signal into magnitude and phase
13 components;

14 a mask processor to determine a hearing threshold for corresponding
15 magnitude components;

16 a pattern generator to generate both a strong watermark and a weak
17 watermark; and

18 a watermark insertion unit to selectively insert one of the strong watermark
19 or the weak watermark into the audio signal based on whether the magnitude
20 components exceed or fall below the hearing threshold.
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1 6. An audio watermark encoding system as recited in claim 5, wherein
2 the watermark insertion unit inserts the strong watermark when the magnitude
3 component exceeds the hearing threshold and inserts the weak watermark when
4 the magnitude component falls below the hearing threshold.

5
6 7. An audio watermark encoding system as recited in claim 5, wherein
7 the watermark insertion unit inserts the strong watermark when the magnitude
8 component exceeds the hearing threshold by a predetermined amount and inserts
9 the weak watermark when the magnitude component falls below the hearing
10 threshold by the predetermined amount.

11
12 8. An audio watermark encoding system as recited in claim 7, wherein
13 the watermark insertion unit foregoes inserting the strong watermark or the weak
14 watermark when the magnitude component lies within the predetermined amount
15 above and below the hearing threshold.

16
17 9. An audio encoding system comprising:
18 an audio watermark encoding system as recited in claim 5; and
19 a compression unit, wherein the compression unit and the audio watermark
20 encoding system both utilize the magnitude components.

21
22 10. An operating system comprising an audio watermark encoding
23 system as recited in claim 5.
24
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1 11. A watermark insertion unit, comprising:
2 an input to receive frequency magnitude components of an audio signal,
3 hearing thresholds derived from the magnitude components, strong watermark
4 values, and weak watermark values; and
5 multiple insertion operators for selectively combining the magnitude
6 components and one of the strong watermark values or the weak watermark values
7 depending upon whether the magnitude components exceed or fall below the
8 hearing thresholds.

9
10 12. An audio watermark detection system, comprising:
11 a synchronization module to determine which portion of a watermarked
12 audio signal might contain a watermark; and
13 a correlation module to detect whether a strong watermark and a weak
14 watermark is present in the portion of the watermarked audio signal.

15
16 13. An audio watermark detection system as recited in claim 12,
17 wherein the correlation module computes a correlation value from the
18 watermarked audio signal and the strong watermark that tends toward a first value
19 when the strong watermark is present and a second value when the strong
20 watermark is not present.

1 14. An audio watermark detection system as recited in claim 12,
2 wherein the correlation module computes a correlation value from the
3 watermarked audio signal and the weak watermark that tends toward a first value
4 when the weak watermark is present and a second value when the weak watermark
5 is not present.

6
7 15. An audio watermark detection system as recited in claim 12,
8 wherein the correlation module computes a correlation value from the
9 watermarked audio signal and one of the strong watermark or the weak
10 watermark, the correlation module determining that said one strong watermark or
11 weak watermark is present when the correlation value exceeds a predetermined
12 threshold plus a random amount.

13
14 16. An operating system comprising an audio watermark detection
15 system as recited in claim 12.

16
17 17. An audio watermark detection system comprising:
18 a converter to convert a watermarked audio signal into magnitude and
19 phase components;
20 a mask processor to determine a hearing threshold for corresponding
21 magnitude components;
22 a pattern generator to generate both a strong watermark and a weak
23 watermark; and
24 a watermark detector to detect presence of the strong watermark and the
25 weak watermark in the audio signal.

1
2 **18.** An audio watermark detection system as recited in claim 17,
3 wherein the watermark detector computes correlation values from the
4 watermarked audio signal and each of the strong watermark and the weak
5 watermark and detects the presence of the strong watermark and the weak
6 watermark based on whether the correlation values exceed a predetermined
7 threshold.

8
9 **19.** An audio watermark detection system as recited in claim 17, further
10 comprising:

11 a random operator for generating a random value; and

12 the watermark detector computes correlation values from the watermarked
13 audio signal and each of the strong watermark and the weak watermark and
14 detects the presence of the strong watermark and the weak watermark based on
15 whether the correlation values exceed a predetermined threshold plus the random
16 value.

17
18 **20.** An audio decoding system comprising:

19 an audio watermark detection system as recited in claim 17; and

20 a decompression unit, wherein the decompression unit and the audio
21 watermark detection system both utilize the magnitude components.

22
23 **21.** An operating system comprising an audio watermark detection
24 system as recited in claim 17.
25

1 **22. (AMENDED)** An audio watermarking architecture,
2 comprising:

3 a watermark encoding system to selectively choose insertion of a strong
4 watermark or a weak watermark into segments of an audio signal; and

5 a watermark detecting system to detect a presence of the strong watermark
6 or the weak watermark in the segments of the audio signal.

7
8 **23.** An audio watermarking architecture as recited in claim 22, wherein
9 the watermark encoding system resides at a content producer to watermark
10 original audio content and the watermark detecting system resides at one or more
11 clients to detect the watermarks and play the original audio content.

12
13 **24.** An audio watermarking architecture as recited in claim 22, wherein
14 the watermark encoding system comprises:

15 a converter to convert the audio signal into magnitude and phase
16 components;

17 a mask processor to determine a hearing threshold for corresponding
18 magnitude components;

19 a pattern generator to generate both the strong watermark and the weak
20 watermark; and

21 a watermark insertion unit to selectively insert one of the strong watermark
22 or the weak watermark into the audio signal based on whether the magnitude
23 components exceed or fall below the hearing threshold.
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1 25. An audio watermarking architecture as recited in claim 22, wherein
2 the watermark detecting system comprises:

3 a converter to convert a watermarked audio signal into magnitude and
4 phase components;

5 a mask processor to determine a hearing threshold for corresponding
6 magnitude components;

7 a pattern generator to generate both a strong watermark and a weak
8 watermark; and

9 a watermark detector to detect presence of the strong watermark and the
10 weak watermark in the audio signal.

11
12 26. **(AMENDED)** A method for watermarking an audio signal,
13 comprising:

14 watermarking a first portion of the audio signal with a strong watermark;
15 and

16 watermarking a second portion of the audio signal with a weak watermark,
17 wherein the first and second portions are distinguishable.

18
19 27. A method for watermarking an audio signal, comprising:

20 comparing samples of the audio signal to a hearing threshold;

21 watermarking samples exceeding the hearing threshold with a strong
22 watermark; and

23 watermarking samples falling below the hearing threshold with a weak
24 watermark.

1 **28.** A method as recited in claim 27, wherein the watermarking samples
2 comprises:

3 watermarking samples exceeding the hearing threshold plus a buffer value
4 with a strong watermark;

5 watermarking samples falling below the hearing threshold by less than the
6 buffer value a with a weak watermark; and

7 leaving samples lying within the buffer value above and below the hearing
8 threshold without a watermark.

9
10 **29.** A method as recited in claim 27, further comprising detecting the
11 strong watermark and the weak watermark in the audio signal.

12
13 **30.** A method as recited in claim 29, wherein the detecting comprises
14 computing a correlation value from the audio signal and the strong watermark, the
15 correlation value tending toward a first value when the strong watermark is present
16 and a second value when the strong watermark is not present.

17
18 **31.** A method as recited in claim 29, wherein the detecting comprises
19 computing a correlation value from the audio signal and the weak watermark, the
20 correlation value tending toward a first value when the weak watermark is present
21 and a second value when the weak watermark is not present.

22
23 **32.** A method as recited in claim 27, further comprising:
24 computing a correlation value from the audio signal and one of the strong
25 watermark or the weak watermark; and

1 determining that said one strong watermark or weak watermark is present
2 when the correlation value exceeds a predetermined threshold plus a random
3 amount.

4
5 **33. (AMENDED)** A method comprising:
6 selectively encoding portions of an audio signal with a strong watermark or
7 a weak watermark; and
8 detecting a presence of the strong watermark and the weak watermark in
9 the audio signal.

10
11 **34. (AMENDED)** A computer readable medium having computer
12 executable instructions for:
13 watermarking a first portion of an audio signal with a strong watermark;
14 and
15 watermarking a second portion of the audio signal with a weak watermark,
16 wherein the first and second portions are distinguishable.

17
18 **35.** A computer readable medium having computer executable
19 instructions for:
20 comparing samples of an audio signal to a hearing threshold;
21 watermarking samples exceeding the hearing threshold with a strong
22 watermark; and
23 watermarking samples falling below the hearing threshold with a weak
24 watermark.

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2
3 36. An audio watermarking system comprising:

4 a pattern generator to generate both a strong watermark and a weak
5 watermark; and

6 a watermark insertion unit to insert the strong watermark and the weak
7 watermark into the audio signal,

8 wherein the watermark insertion unit selectively choose insertion of the
9 strong watermark or the weak watermark into segments of the signal according to
10 an audible measure of the segments.
11

12 37. An audio watermarking system comprising

13 a pattern generator to generate both a strong watermark and a weak
14 watermark; and

15 a watermark insertion unit to insert of the strong watermark into one or
16 more first segments of the audio signal and to insert of the weak watermark into
17 one or more second segments of the audio signal, wherein the first and second
18 segments are distinguishable.
19

20 38. An audio watermarking system as recited in claim 37, wherein the
21 watermark insertion unit selectively chooses segments for insertion of the
22 watermarks according to an audible measure of the segments.
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1 39. An audio watermarking system as recited in claim 37, wherein the
2 watermark insertion unit selectively chooses segments for insertion of the strong
3 watermark according to an audible measure of the segments.

4
5 40. An audio watermarking system as recited in claim 37, wherein the
6 watermark insertion unit selectively chooses segments for insertion of the weak
7 watermark according to an audible measure of the segments.

8
9 41. An audio watermarking system as recited in claim 37, further
10 comprising:

11 a processor to determine a hearing threshold for segments of the audio
12 signal; and

13 the watermark insertion unit inserts the strong watermark into a segment
14 when the signal of that segment exceeds the hearing threshold and insert the weak
15 watermark into a segment when the signal of that segment falls below the hearing
16 threshold.

17
18 42. An operating system comprising an audio watermarking system as
19 recited in claim 37.